

(12) UK Patent Application (19) GB (11) 2 367 747 (13) A

(43) Date of A Publication 17.04.2002

(21) Application No 0105253.9

(22) Date of Filing 02.03.2001

(71) Applicant(s)

Pacific Rim Wood (UK) Ltd
(Incorporated in the United Kingdom)
Royal Victoria House, The Pantiles,
ROYAL TUNBRIDGE WELLS, Kent, TN2 5JU,
United Kingdom

(72) Inventor(s)

Shaun Hannan

(74) Agent and/or Address for Service

Forrester Ketley & Co
Forrester House, 52 Bounds Green Road, LONDON,
N11 2EY, United Kingdom

(51) INT CL⁷

A62C 2/06 , E06B 5/16

(52) UK CL (Edition T)

A5A A23
E1J JGS

(56) Documents Cited

GB 2081787 A **GB 1538429 A**
JP 070208033 A **JP 2000310090 A**

(58) Field of Search

UK CL (Edition S) A5A A21 A22 A23 A37 , E1J JGS
INT CL⁷ A62C 2/06 2/10 , E06B 5/16
Online: WPI, EPODOC, JAPIO

(54) Abstract Title

Fire barriers

(57) A fire barrier comprises a pair of facing panels and a timber core 3 located between the facing panels to space the facing panels from one another. The timber core of the invention has a laminate construction comprising a plurality of discreet timber laminae 3a, 3b, 3c. Each timber lamina is orientated such that its grain direction is not substantially parallel to the grain direction of the or each adjacent timber lamina. Preferably, each timber lamina is oriented so that its grain direction is substantially at right angles to the grain direction of the or each adjacent lamina.

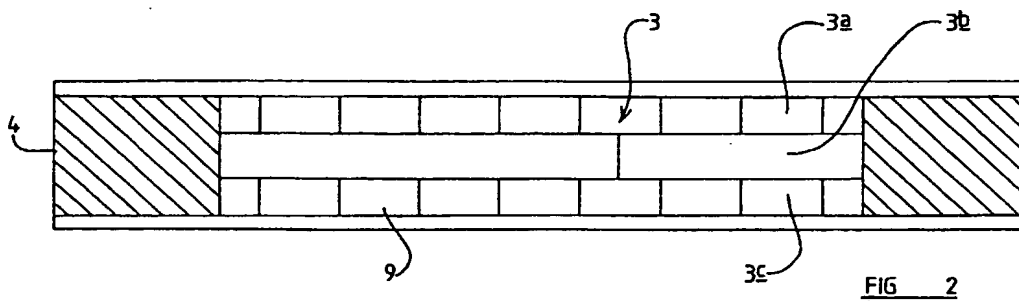


FIG 2

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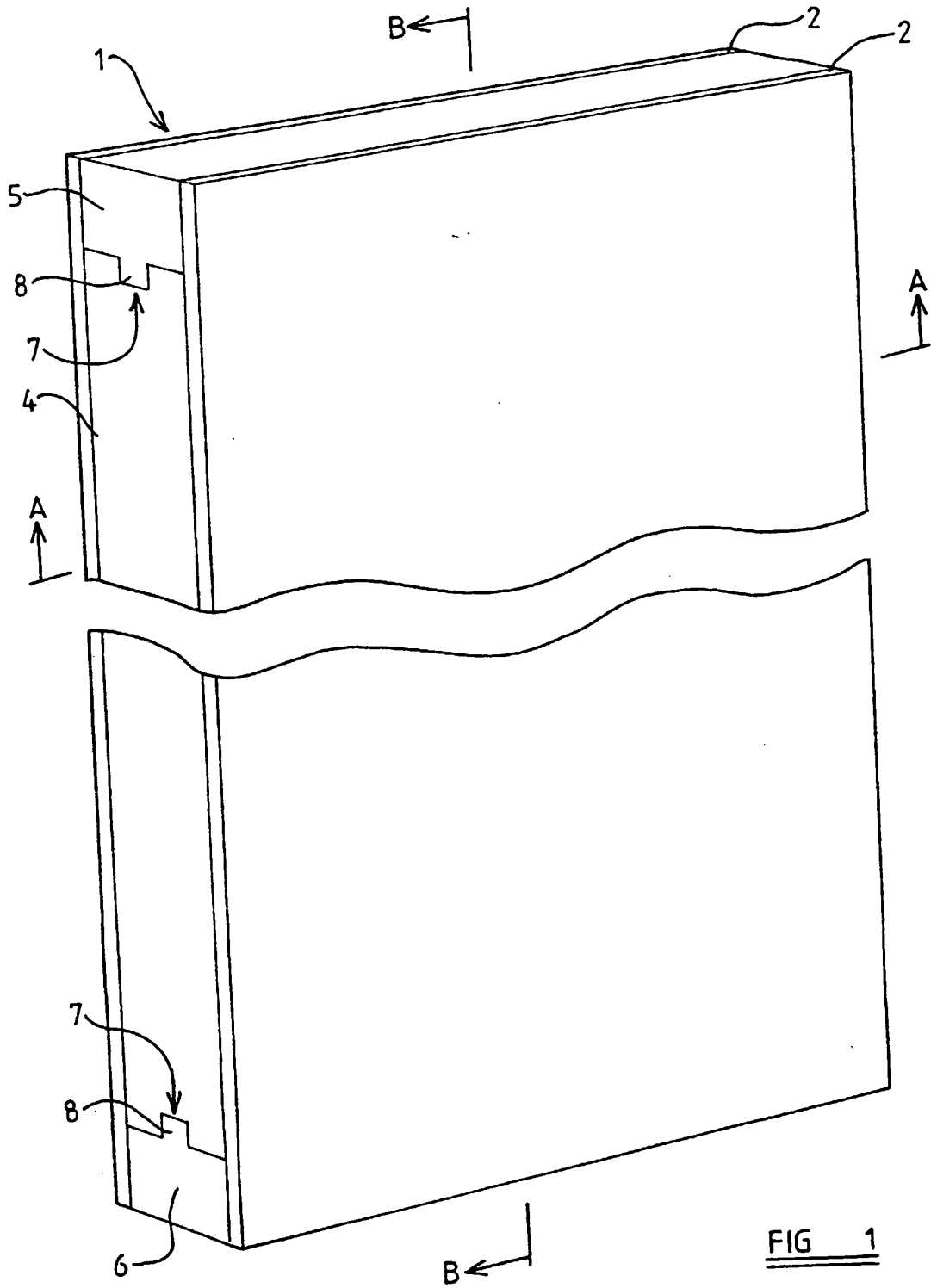
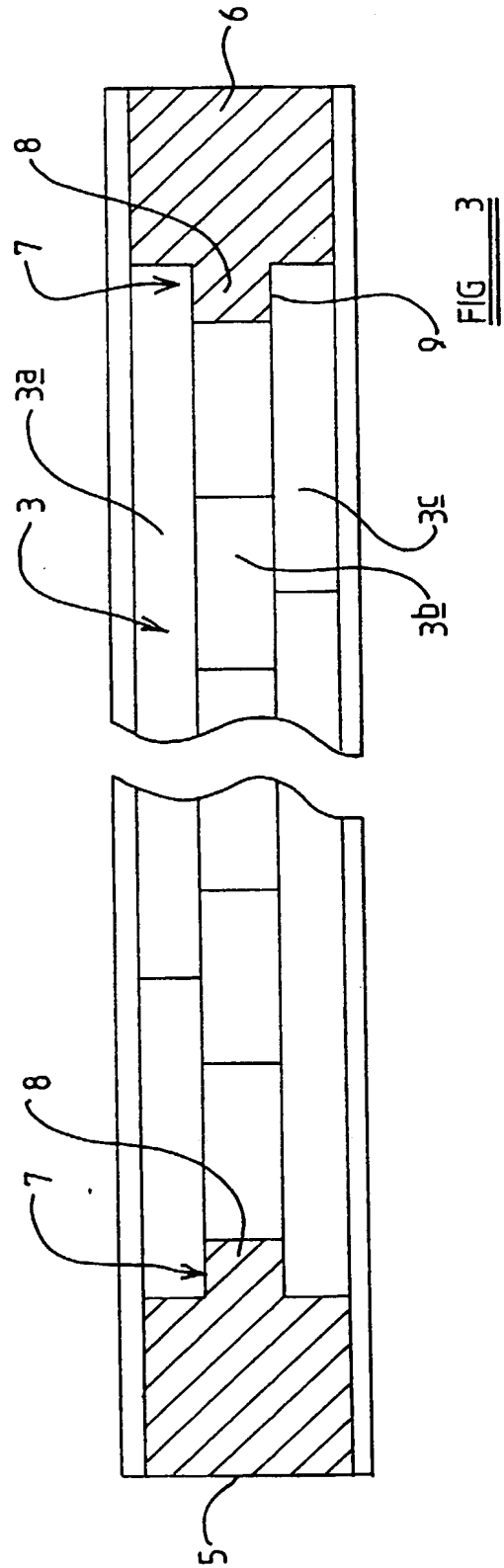
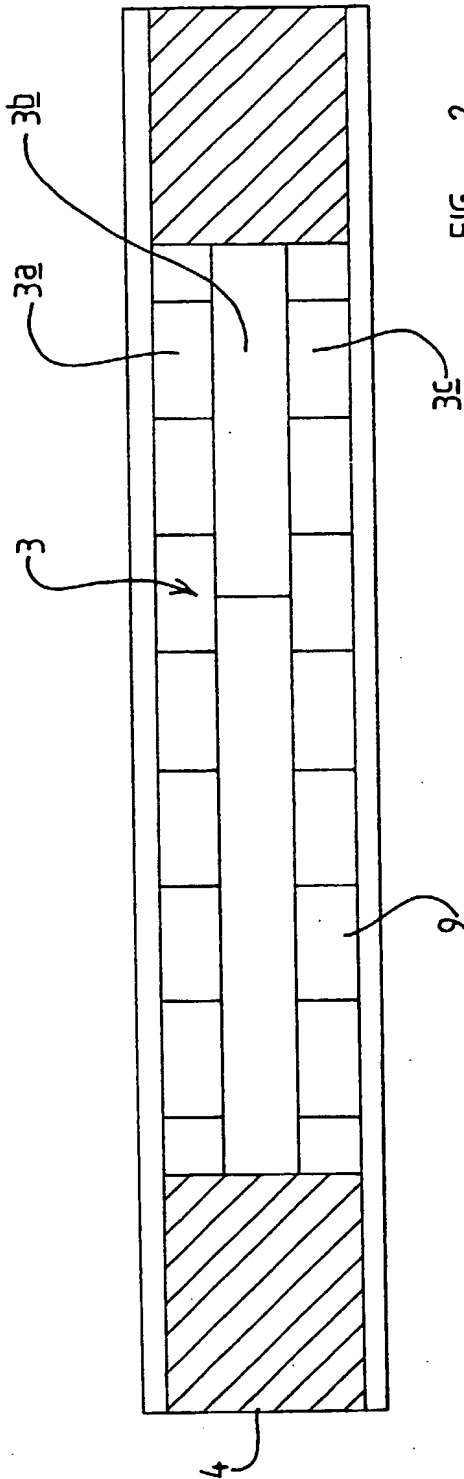


FIG 1



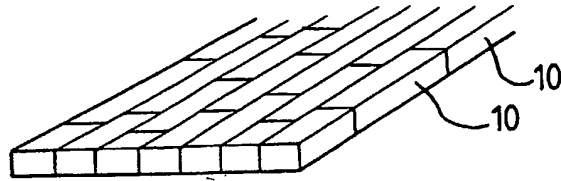


FIG 4a

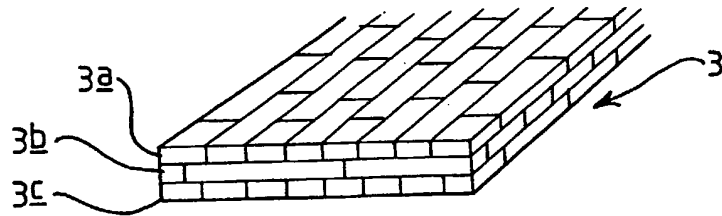


FIG 4b

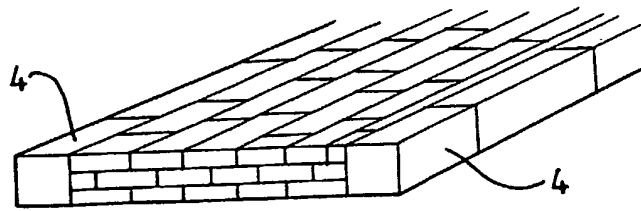


FIG 4c

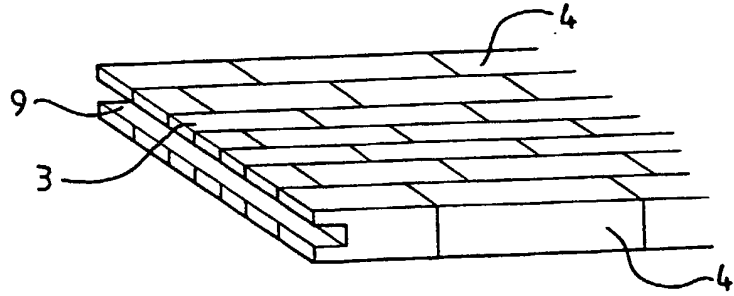


FIG 4d

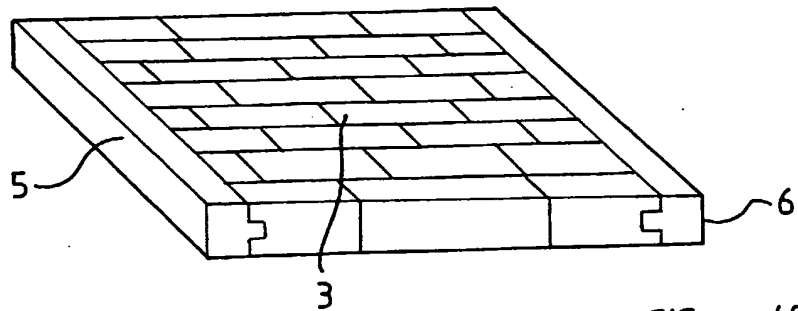


FIG 4e

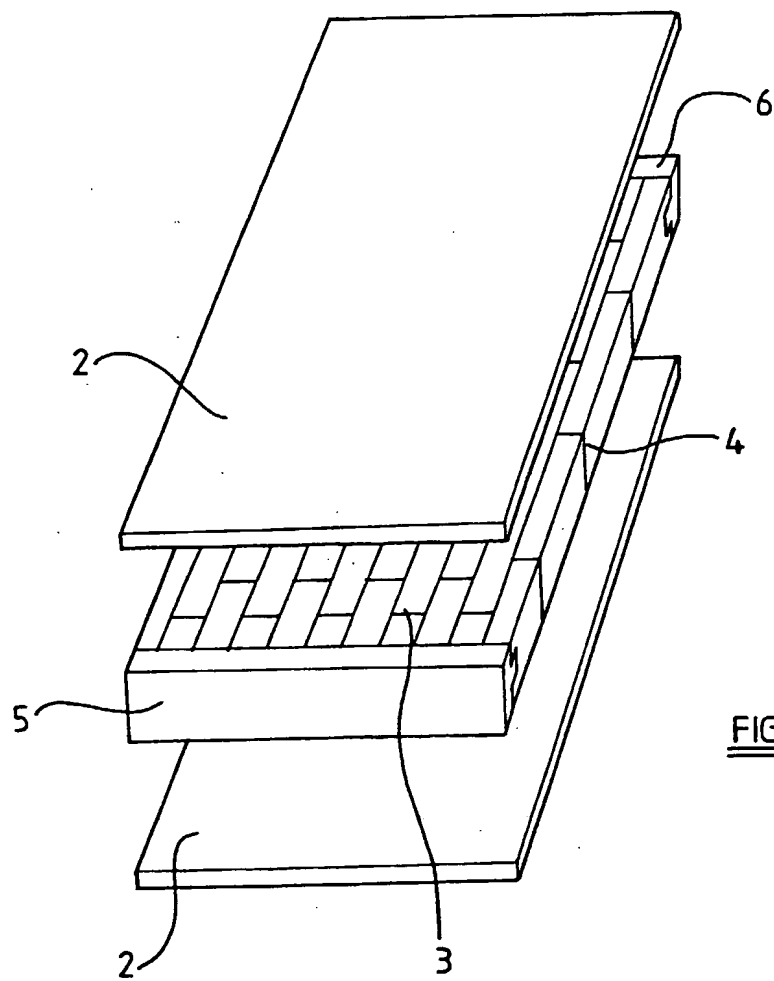


FIG 4f

PATENTS ACT 1977

P15126GB-H/SJP/smt

Title of Invention: *"Improvements in or relating to fire barriers"*

THE PRESENT INVENTION relates to a fire barrier. More particularly, the invention relates to a fire barrier of the type comprising a pair of facing panels and having a timber core located between the facing panels.

The fire barrier construction of the present invention is particularly suitable for use as a fire door or a blank from which a fire door can be made, by, for example, fitting hinges, door handles and panes of glass, as appropriate.

Strict rules govern the installation conditions and materials used to provide fire barriers to ensure that the barriers will contain a fire for a specified period of time and under certain conditions. Blanks for fire doors are tested under controlled conditions as defined, for example, in British Standard No. BS 476: Part 22: 1987. Blanks for fire doors of this type are sold supported by test reports and global assessments which define the permissible sizes of the doors, sizes and types of glass for glazing apertures, hinge specifications, latch specifications, intumescent strips, framing materials, size of gaps between the frame and the door, and other such details.

It is important for all fire barriers to be stable, particularly when subjected to fire conditions as excessive bowing, warping or twisting can all be detrimental to the effectiveness of the fire barrier, particularly in the case of fire doors

which, if allowed to bow, warp or twist, can move away from the associated doorframe, thereby allowing flames and smoke to penetrate the barrier prematurely.

Prior art fire barriers particularly suitable for use as fire doors typically comprise a timber core to which is adhesively bonded a pair of facing panels which, in the completed product, define the outer surfaces of the door. It is known, in such constructions, to use a core of either a hardwood or a softwood timber, or a wood based panel product and to use plywood or other wood based sheet material as the facing panels.

The timber cores of the above-mentioned type of known fire barrier comprise only a single layer, although some such barriers, have a core comprising a plurality of timber blocks which are edge bonded to one another using an adhesive, to provide the single layer core.

However, it has been found that fire barriers of the above-mentioned known type of construction, can sometimes have inadequate dimensional stability, can be relatively heavy (which is clearly disadvantageous in the case of fire barriers used as doors) and can sometimes easily warp.

It is therefore an object of the present invention to provide an improved fire barrier.

Accordingly, the present invention provides a fire barrier comprising a pair of facing panels, and a timber core located between the facing panels to space the facing panels from one another, the timber core having a laminate construction comprising a plurality of discreet timber laminae, each said timber lamina being

oriented such that its grain direction is not substantially parallel to the grain direction of the or each adjacent timber lamina.

Preferably, each timber lamina of the core is oriented such that its grain direction is substantially at right angles to the grain direction of the or each adjacent lamina.

Advantageously the timber core comprises three laminae.

Conveniently the timber core comprises timber of the Falcata species.

Preferably each lamina comprises timber of the Falcata species.

Advantageously, the timber core is made exclusively of timber of the Falcata species.

Conveniently, each lamina comprises a plurality of timber blocks adhesively secured to one another.

Preferably, the laminae of the timber core are adhesively secured to one another.

Advantageously the facing panels are made of plywood.

Conveniently, the facing panels are made of medium density fibreboard.

Advantageously, the facing panels are made of wood particle board.

Preferably each facing panel is adhesively secured to the timber core.

Advantageously the fire barrier is provided in the form of a fire door.

Conveniently, the fire barrier is provided in the form of a blank for a fire door.

So that the invention may be more readily understood, and so that further features thereof may be appreciated, the embodiments of the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a fire barrier in accordance with the present invention, part of the barrier not being illustrated;

Figure 2 is a cross-sectional view along line A-A of Figure 1;

Figure 3 is a cross-sectional view along line B-B of Figure 1; and

Figure 4 is a schematic drawing illustrating various stages of the production process for a fire barrier of the present invention.

Turning now to consider Figure 1, there is illustrated a fire barrier in the form of a blank 1 for a fire door. The blank 1 is initially provided having the general dimensions of a fire door, such that the blank may be finished, for example, by the addition of hinges, door handles and window glass, so as to take the form of a fire door. Whilst the present invention is described hereinafter with particular reference to a blank for a fire door, it will be appreciated that the present invention is equally applicable to other types of fire barrier.

The fire door blank 1 illustrated in Figure 1 comprises two generally flat and parallel facing panels 2 which, in the preferred embodiment, comprise conventional plywood of a type known *per se*, or conventional medium density fibreboard (MDF), also known *per se*. The two facing panels 2 are adhesively bonded to a timber core 3 (not illustrated in Figure 1, but which will be described in more detail hereinafter).

Along each vertical edge of the fire door blank 1 (in the orientation illustrated in Figure 1) there is provided a substantially vertical stile 4 (only one being illustrated in Figure 1). Each stile 4 comprises a length of timber material having a generally square or rectangular cross-section of the same nominal thickness as the laminated core, and is adhesively bonded between the two facing panels 2.

Along the top and bottom edges of the fire door blank (in the orientation illustrated in Figure 1), there is provided a top rail 5 and a bottom rail 6, each being generally identical to one another. The top and bottom rails 5,6 comprise a length of timber of dimension generally equal to the width of the fire door blank 1 such that the top and bottom rails 5,6 extend the full width across the fire door blank 1. As can be seen from Figures 1 and 3, the top and bottom rails, 5,6, each engage the two substantially vertical stiles 4, and the core 3 (Figure 3) by way of a tongue and groove connection, illustrated generally at 7, the top and bottom rails, 5,6 each being provided with an inwardly directed square sectioned flange or tongue 8 and each substantially vertical stile 4 being provided with an outwardly directed square sectioned groove 9 configured for co-operation with the flange 8. As would be appreciated the core 3, as illustrated in Figure 3, is also provided with a groove of generally identical cross-section to the grooves 9 formed in the substantially vertical stiles 4.

Turning now to consider Figures 2 and 3 in more detail, it will be seen that the timber core 3 has a laminate construction comprising three discrete timber laminae, indicated as 3a, 3b and 3c, respectively, which are adhesively bonded to one another. It should be appreciated that whilst the preferred embodiment illustrated in the accompanying drawings is provided with a core 3 having three laminae, it is also envisaged that other variants of the present invention may have a different number of laminae. The important aspect is that there is a plurality of laminae to the core 3. If the laminae are of equal thickness around the centre core, then a well balanced construction results.

Each timber lamina, 3a, 3b and 3c is orientated such that its grain direction (i.e. the direction in which the grain of the wood runs) is at an angle to the grain direction to the or each adjacent timber lamina. In this specification "at an angle to" is intended to describe any arrangement in which the grain direction of each lamina is not substantially parallel to that of the or each adjacent lamina. In the preferred embodiment illustrated, each timber lamina of the core 3 is oriented such that its grain direction is substantially at right angles to the grain direction of the or each adjacent lamina. For example, the grain direction of laminae 3a and 3c runs into the page in Figure 2, and along the page in Figure 3 whereas the grain direction of the central lamina 3b runs along the page in Figure 2 and into the page in Figure 3. It has been found that orienting each lamina such that its grain direction is at an angle to the or each adjacent lamina, and preferably at right angles to the grain direction of the or each adjacent lamina, significantly improves the stability and strength of the fire door blank 1.

As illustrated in Figures 2 and 3, each lamina 3a, 3b, 3c of the timber core 3 comprises a plurality of timber blocks which are each adhesively secured to one another. In the preferred embodiment illustrated, each timber block 9 takes a

form of a generally elongate rectangular block, with its longer dimension being generally parallel to its grain direction. The timber blocks 9 comprising each lamina 3a, 3b, 3c are edge- glued together.

It should be appreciated that it is not essential that each of the timber blocks 9 of a respective laminae 3a, 3b, 3c to be of equal length. Providing the timber blocks 9 are fitted together sufficiently tightly for the respective lamina 3a, 3b, 3c, to have no voids, then the structure is sufficient for the present invention. It has been found that the use of a plurality of timber blocks 9 to build up each laminae 3a, 3b, 3c allows a more efficient use of timber than would be the case if each laminae 3a, 3b, 3c were to be made of single sheets of timber or a plurality of elongate batons, each having a length substantially equal to the length of the lamina.

It has been found the core 3 of the present invention particularly enables the use of light weight fast growing plantation species such as *Falcata* (*Parasoriantes Falcateria* or *Albazia Falcata*) which could not otherwise be successfully used in this application. In addition, the composite based on such timber in the core 3 of the fire barrier of the present invention provides an exceptionally lightweight structure with both strength and stability in all directions. Of course, other fast growing lightweight plantation wood can also be used.

To illustrate more clearly the construction of the fire barrier of the present invention, the preferred process for constructing a fire door blank 1 will now be described with reference to Figure 4.

As illustrated in Figure 4a, each individual lamina 3a, 3b, 3c is initially built up from a plurality of elongate rectangular timber blocks 9 which are edge glued to

one another to form a substantially flat lamina. This gluing of the timber blocks 9 ensures that each distinct lamina remains stable until it is subsequently bonded to the others. It is important for the grain direction of each individual timber block 9 of a respective lamina 3a, 3b, 3c to be substantially aligned. However, as can be clearly seen from Figure 4a, it is not essential for each of the timber blocks 9 of a respective lamina 3a, 3b, 3c to be equal in length.

As illustrated in Figure 4b, once the desired number of laminae have been assembled from their component timber blocks 9, they are adhesively bonded to one another to form the core 3. As described above, the laminae are orientated relative to one another such that the grain direction of the component timber blocks 9 of each individual lamina are at an angle (and preferably at right angles) to the grain direction of the component timber blocks 9 of the or each adjacent lamina in the stack. The core 3 is then sanded.

As illustrated in Figure 4c, the stiles 4 are then adhesively bonded to respective sides of the timber core 3. The composite core 3 is then cut to length and the top and bottom edges are then grooved, as illustrated in Figure 4d, to receive (as illustrated in Figure 4e) the top and bottom rails 5,6.

The core, stiles and top and bottom rails, when joined together are then all sanded again before the plywood medium density fibreboard or wood particle board facing panels 2 are adhesively bonded to respective sides of the assembly.

The fire door blank 1 can then be fabricated into a fire door by the provision of, for example, hinges, handles and window glazing, as desired for any particular specification.

It has been found that the multiple cross-grain structure of the timber core 3 of the fire barrier 1 of the present invention provides particularly good dimensional stability and strength, whilst being lightweight which is clearly an advantage, particularly when the fire barrier 1 is used as a fire door. The multiple layer core structure also ensures that the fire door remains generally flat and is less prone to warping, either naturally or under fire conditions, thereby minimising the risk of the fire barrier being breached.

In the present specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A fire barrier comprising a pair of facing panels, and a timber core located between the facing panels to space the facing panels from one another, the timber core having a laminate construction comprising a plurality of discrete timber laminae, each said timber lamina being oriented such that its grain direction is not substantially parallel to the grain direction of the or each adjacent timber lamina.
2. A fire barrier according to claim 1, wherein each timber lamina of the core is oriented such that its grain direction is substantially at right angles to the grain direction of the or each adjacent lamina.
3. A fire barrier according to claim 1 or claim 2, wherein the timber core comprises three laminae.
4. A fire barrier according to any preceding claim, wherein the timber core comprises timber of the Falcata species.
5. A fire barrier according to claim 4, wherein each lamina comprises timber of the Falcata species.
6. A fire barrier according to claim 5, wherein the timber core is made exclusively of timber of the Falcata species.

7. A fire barrier according to any preceding claim, wherein each lamina comprises a plurality of timber blocks adhesively secured to one another.
8. A fire barrier according to any preceding claim, wherein the laminae of the timber core are adhesively secured to one another.
9. A fire barrier according to any preceding claim, wherein the facing panels are made of plywood.
10. A fire barrier according to any one of claims 1 to 8, wherein the facing panels are made of medium density fibreboard.
11. A fire barrier according to any preceding claim, wherein the facing panels are made of wood particleboard.
12. A fire barrier according to any preceding claim, wherein each facing panel is adhesively secured to the timber core.
13. A fire barrier according to any preceding claim in the form of a fire door.
14. A fire barrier according to any preceding claim in the form of a blank for a fire door.
15. A fire barrier substantially as hereinbefore described and as shown in the accompanying drawings.

16. Any novel feature or combination of features disclosed herein.

Amendments to the claims have been filed as follows

1. A fire barrier comprising a pair of facing panels, and a timber core located between the facing panels to space the facing panels from one another, the timber core having a laminate construction comprising a plurality of discreet timber laminae, each said timber lamina being oriented such that its grain direction is not substantially parallel to the grain direction of the or each adjacent timber lamina, wherein the timber core comprises timber of the Falcata species, and wherein each lamina comprises a plurality of timber blocks.
2. A fire barrier according to claim 1, wherein each timber lamina of the core is oriented such that its grain direction is substantially at right angles to the grain direction of the or each adjacent lamina.
3. A fire barrier according to claim 1 or claim 2, wherein the timber block of each lamina are adhesively secured to one another.
4. A fire barrier according to any preceding claim, wherein the timber core comprises three laminae.
5. A fire barrier according to any preceding claim, wherein each lamina comprises timber of the Falcata species.
6. A fire barrier according to claim 5, wherein the timber core is made exclusively of timber of the Falcata species.

7. A fire barrier according to any preceding claim, wherein the laminae of the timber core are adhesively secured to one another.
8. A fire barrier according to any preceding claim, wherein the facing panels are made of plywood.
9. A fire barrier according to any one of claims 1 to 7, wherein the facing panels are made of medium density fibreboard.
10. A fire barrier according to any preceding claim, wherein the facing panels are made of wood particleboard.
11. A fire barrier according to any preceding claim, wherein each facing panel is adhesively secured to the timber core.
12. A fire barrier according to any preceding claim in the form of a fire door.
13. A fire barrier according to any preceding claim in the form of a blank for a fire door.
14. A fire barrier substantially as hereinbefore described and as shown in the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0105253.9
Claims searched: 1 to 15

Examiner: Colin Thompson
Date of search: 17 December 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A5A (A21, A22, A23, A37); E1J (JGS)

Int Cl (Ed.7): A62C 2/06, 2/10; E06B 5/16

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2081787 A (Svenska Dörr AB)	
A	GB 1538429 A (Insulation Equipments Ltd)	
X	JP 2000310090 A (Nonaka KK) See whole document	1-3,13
X	JP 070208033 A (Aica Kogyo Co Ltd) See whole document	1-4,8,13

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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